



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Reg. Std. File

OCT 27 1992

OFFICE OF
PREVENTION, PESTICIDES
AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Reregistration of Ethephon. Storage stability data (MRID Nos. 42268904 through 42268909 and 42300801 through 42300808), residue data on wheat grain and straw (MRID No. 42268902), tomatoes (MRID No. 42268903), and pineapple (MRID No. 42298201), as well as wheat grain processing data (MRID No. 42268901) and pineapple processing data (MRID No. 42298201).
CBRS No. 9887. DP Barcode No. D178357.
Chemical No. 099801.

FROM: Bonnie Cropp-Kohliligian, Environmental Scientist
Reregistration Section II
Chemistry Branch II: Reregistration Support
Health Effects Division [H7509C]

THRU: Edward Zager, Chief
Chemistry Branch II: Reregistration Support
Health Effects Division [H7509C]

TO: Lois Rossi, Chief
Reregistration Branch
Special Review and Reregistration Division [H7508W]

Attached is the review of data submitted by Rhone-Poulenc in response to various ethephon reregistration requirements. This information was reviewed by Acurex Corporation under supervision of CBRS, HED. The data assessment has undergone secondary review in the Branch and has been revised to reflect Branch policies.

It is recommended that a copy of this review be sent to the Registrant.

Attachment 1: Ethephon CBRS No. 9887; DP Barcode D178357.
Registrant's Response to Residue Chemistry Data Requirements.

cc: BLCKohliligian, Circulate, Ethephon Reg. Std. File, SF, Acurex.
cc: RF (without attachment).

TDI: WHazel:9/30/92 EZager:10/12/92
H7509C:CBRS:BLCKohliligian:CM#2:Rm 803:703-305-7462:9/24/92.



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ETHEPHON
(Chemical Code 099801)
(CBRS No. 9887; DP Barcode D178357)

TASK 3

**Registrant's Response
to Residue Chemistry Data
Requirements**

August 7, 1992

Contract No. 68-DO-0142

Submitted to:

U.S. Environmental Protection Agency
Arlington, VA 22202

Submitted by:

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ETHEPHON

(Chemical Code 099801)

(CBRS No. 9887; DP Barcode D178357)

REGISTRANT'S RESPONSE TO RESIDUE CHEMISTRY REQUIREMENTS

Task 3

BACKGROUND

The Ethephon Guidance Document dated 9/88 required residue data on numerous crops. It also required that sample storage intervals and conditions be reported for all residue samples and that all residue data, previously submitted and currently requested, be supported by adequate storage stability data.

The outstanding data requirements were reviewed in the Ethephon Reregistration Standard Update of 4/23/91. Requirements for magnitude of the residue data were outstanding for certain tomato, apple, grape, barley, wheat, barley and wheat straw, coffee, cottonseed, pineapple, sugarcane, and tobacco commodities. Subsequently, the registrant submitted data on apples that were reviewed by the Agency (P. Deschamp, CBRS No. 8564, dated 4/1/92; D. McNeilly, CBRS No. 10246, dated 9/8/92). The Agency concluded that the available data are adequate to determine residue concentrations in apple processed commodities, and that food/feed additive tolerances must be proposed pending submission of adequate storage stability data, an explanation of the way in which ethephon (ppm) values were calculated from the provided chromatograms and the reanalyses of a reasonable number of RAC and processed samples once chromatographic conditions have been optimized to validate submitted field trial data. The registrant also submitted data regarding residues of ethephon in or on tomatoes and processed fractions that were reviewed by the Agency (P. Deschamp, CBRS No. 8635, dated 3/31/92). Adequate geographic representation was not provided, because no data were presented from FL. The Agency also concluded that the available data on tomato processed commodities are adequate pending receipt of adequate storage stability data on tomato processed commodities. Tomato processed fractions were stored for 15 months prior to analyses. Data were also provided that depict ethephon residues in or on grapes and raisin waste, and found inadequate (reviewed by B. Cropp-Kohlligian, CBRS No. 7936, dated 9/26/91) due to insufficient storage stability data and poor chromatographic results, thus, requiring the reanalyses of a reasonable number of RAC and processed samples once chromatographic conditions have been optimized to validate the submitted field trial data. Adequate geographic representation was not provided to support established tolerances in/on grape commodities; therefore the Agency recommended that the registrant provide additional data from states such as MI, NY, and WA or propose tolerances with regional registrations. In addition, the established PHI is 14-days, and the registrant provided data on raisin waste depicting residues from samples with 45-75 day posttreatment intervals.

Regarding the requirement for data on pineapple forage, the registrant requested a waiver from data requirements and CBRS (Agency list of Time Extensions & Data Waivers: Group 4, dated 10/26/89) granted the data waiver for pineapple forage providing that the registrant revise the label to restrict the feeding of treated foliage to livestock.

The 1991 Reregistration Standard Update also reviewed interim storage stability data and commented on storage stability issues. The data on walnuts and cantaloupes indicated the potential for instability. The registrant has consequentially committed to submit new walnut residue studies with <6-month sample storage intervals, rather than conduct a long-term storage stability study to support the existing data. The Agency (P. Deschamp; CBRS No. 8127, dated 7/18/92 and CBRS No. 8627, dated 4/3/92) stipulated that the new studies be accompanied by a concurrent storage stability study. A marked decline was noted in freeze-dried melon samples stored at room temperature for 6 months, raising concerns about the validity of residue data reviewed for the Guidance Document (studies from CA and PA in which freeze-dried samples were stored at ambient temperature for 483-894 days). The registrant has not responded to this concern.

The current Rhône-Poulenc package contains the final storage stability reports (1992; MRIDs 42268904 through 09, and 42300801 through 08), and residue data on wheat grain and straw (1992; MRID 42268902), tomatoes (1992; MRID 42268903), and pineapple (1992; MRID 42298201), as well as processing studies on wheat grain (1992; MRID 42268901) and pineapple (1992; MRID 42298201).

The Conclusions and Recommendations stated herein are intended to update the status of residue data used to support established tolerances, particularly with respect to adequacy of supporting storage stability data and reporting of sample storage intervals and conditions.

The qualitative nature of the residue in plants is adequately understood. Ethephon is the residue of concern. Tolerances for residues in or on raw agricultural commodities are currently expressed in terms of ethephon [(2-chloroethyl) phosphonic acid] (40 CFR §180.300[a] and [b]).

Method I, PAM Vol. II has undergone successful Agency validation, and is adequate for tolerance enforcement and data collection; however the 4/91 Update required that the registrant replace diazomethane with a safer methylating agent. The FDA Pesttrack database (PAM Vol. I Appendix) dated 11/90 indicates that ethephon is not likely to be recovered through any of the Multiresidue Protocols.

No Codex MRLs exist for ethephon residues in or on wheat grain, wheat straw, or pineapple forage. The JMPR has recommended a guideline level of 2 ppm for ethephon residues in or on pineapple. This level is the same as the established U.S. tolerance. The guideline level for ethephon residues in or on tomatoes (3 ppm) is higher than the established U.S. tolerance (2 ppm). Should the Codex Committee adopt this recommendation, compatibility could be

achieved by increasing the U.S. tolerance to 3 ppm. However, any tolerance increase is dependent on toxicological considerations.

CONCLUSIONS

- 1a. Adequate residue methodologies were submitted for collecting ethephon residue data from tomatoes, pineapples (including processed commodities), wheat (grain, straw and processed commodities), apples, peppers, cherries, grapes, and blackberries. The registrant also provided residue methodologies for collecting monochloroacetic acid (MCAA) residues from tomatoes, pineapples, wheat grain, and straw, grapes, blackberries, cottonseed, raisin waste, and cantaloupes.
- 1b. Freeze drying is considered to be part of the sample treatment prior to analysis, and therefore should be covered by adequate storage stability data to ensure no losses of actual residues are incurred.
2. The submitted data indicate that residues of ethephon are stable in fresh frozen ($\leq -15^{\circ}\text{C}$) peppers, cherries, pineapple, apples, grapes, tomatoes, and blackberries stored for 24 months. Ethephon residues are also stable in freeze-dried cherries, pineapple, apples, grapes, tomatoes, and blackberries for 24 months stored at room temperature. The data indicate, however, that ethephon residues are only stable in freeze-dried peppers for up to 4 months stored at room temperature, with $\leq 30\%$ remaining after 18 months of storage.
3. Peppers. The submitted storage stability data adequately support only those samples freeze dried and stored for ≤ 4 months or fresh frozen for ≤ 2 years. An adequate description of the actual sample storage intervals and conditions (fresh frozen vs. freeze-dried) associated with each sample have not been provided for the existing residue data. The registrant must provide the actual storage intervals in which pepper samples were stored fresh, and the intervals in which the samples were stored freeze dried, before final judgement as to the adequacy of those data can be determined.
- 4a. Tomatoes. The submitted storage stability and residue data are adequate. The available data support the currently established 2 ppm tolerances for ethephon residues in or on tomatoes. No additional data are required.
- 4b. Tomato processed commodities. No data pertaining to storage stability were included in the current submission. Data are required depicting residue stability in samples stored for at least 15 months to support the existing residue data. Additional information is required.

5. Cucumbers. No data pertaining to sample storage or storage stability were included in the current submission. The registrant must report the sample storage intervals for the cucumber studies previously reviewed, and must supply supporting storage stability data.
6. Melons. No data depicting the storage stability of ethephon in melons were included in the current submission. Long-term storage stability data were required by the 1991 Update to support existing residue data. Storage stability data for residues of ethephon in/on cantaloupes (MRID 41668206) indicated that residues are stable up to at least 6 months if fresh-frozen and unstable after 4 months if freeze-dried. If the forthcoming data invalidate any of the existing residue studies, those studies may have to be repeated.
7. Pumpkins. Data on cantaloupes will translate to pumpkins.
- 8a. Apples. The submitted storage stability data are adequate. The available data support the currently established 5 ppm tolerance for ethephon per se in or on apples pending the reanalyses of a reasonable number of field treated/spiked apple samples under optimized chromatographic conditions to verify reported residue results (see review by D. McNeilly, CBRS No. 10246, dated 9/8/92).
- 8b. Apple processed commodities. No data pertaining to storage stability were included in the current submission. Data depicting residue stability in apple processed samples stored for at least 12 months and the reanalyses of a reasonable number of processed apple samples under optimized chromatographic conditions to verify reported residue results (see review by D. McNeilly, CBRS No. 10246, dated 9/8/92) are required to support the existing residue data. Additional information is required.
9. Cherries. The submitted storage stability data are adequate. The available data support the currently established 10 ppm tolerance for ethephon per se in or on cherries. No additional data are required.
10. Blackberries. The submitted storage stability data are adequate. The available data support the currently established 30 ppm tolerance for ethephon per se in or on blackberries. No additional data are required.
- 11a. Grapes. The submitted storage stability data indicate that ethephon residues are stable for up to 2 years in grape samples stored fresh frozen or freeze dried and stored at room temperature. However, an adequate description of the actual sample storage intervals and conditions have not been provided for the existing field trial data. If actual storage intervals exceed 2 years, additional storage stability data will be required.

- 11b. Grape processed commodities. The outstanding ethephon residue data on raisin waste must be supported by adequate storage stability data. To date, no data have been submitted that depict the stability of ethephon in raisin waste. No data pertaining to storage stability of ethephon in/on grape processed commodities were included in the current submission. In addition, an adequate description of the actual sample storage intervals has not been provided for the existing residue data. The registrant must provide the actual storage intervals in which grape processed fractions were stored fresh, the intervals in which samples were stored freeze dried, and adequate storage stability data, before final judgement as to the adequacy of those data can be determined.
- 11c. A reasonable number of grape and processed grape commodity samples must be reanalyzed under optimized chromatographic conditions to verify reported residue results (see review by B. Cropp-Kohlligian, CBRS No. 7936, dated 9/26/91).
12. Macadamia nuts. Data requested on walnuts will translate to macadamia nuts.
13. Walnuts. No new residue data were included in the current submission. Because, the registrant has not adequately clarified uncertainties concerning the available data, CBRS (refer to P. Deschamp review of 4/3/92) has recommended that the registrant conduct concurrent stability studies when samples from the new walnut field trails are harvested. Additional residue data are required.
14. Barley grain and straw. Data requested on wheat grain and straw will translate to barley grain and straw.
- 15a. Wheat grain and straw. The submitted data adequately support the currently established 2 ppm and 10 ppm tolerances for ethephon residues in or on wheat grain and straw, respectively, pending submission of adequate storage stability data. An interim storage stability study was previously submitted (MRID Nos. 4166820 and 41668202) which indicated that ethephon residues are stable in/on wheat grain and straw for up to 6 months when stored fresh frozen. However, data depicting residue stability in samples stored for at least 393 days are required to support the existing residue data. Additional information is required.
- 15b. Wheat processed commodities. The submitted data indicate that ethephon residues concentrate in bran (1.4x), shorts and germ (1.5x), and red dog (1.2x) but do not concentrate in grain dust, middlings, or flour. The data also indicate that ethephon residues in wheat commodities processed from treated grain are not likely to exceed the established food/feed additive tolerances of 5 ppm for wheat milled fractions. However, the final adequacy of these data will be determined upon receipt of adequate supporting storage stability data. Data depicting residue stability in samples stored for at least 140 days are required to support the existing residue data. Additional information is required.

16. Coffee beans/coffee processed commodities. No data were included in the current submission. Residue data requirements remain outstanding. Data on storage intervals, conditions, and stability of ethephon residues must accompany all data submitted in response to outstanding requirements.
- 17a. Cottonseed. No ethephon storage stability or residue data were included in the current submission. Residue data requirements remain outstanding. Data on storage intervals, conditions, and stability for residues of ethephon must accompany all data submitted in response to outstanding requirements. Currently only samples stored fresh frozen for ≤ 6 months are supported by storage stability data (MRID 41668215).
- 17b. Cottonseed processed commodities. No data pertaining to storage stability were included in the current submission. Data depicting residue stability in hull samples stored for at least 421 days, crude oil samples stored for at least 416 days, refined oil samples stored for at least 315 days, soapstock samples stored for at least 446 days, and meal samples stored for at least 430 days are required to support the existing residue data. The final adequacy of these data will be determined upon receipt of adequately supporting storage stability data.
- 18a. Pineapples. The submitted storage stability and residue data adequately support the currently established 2 ppm tolerances for ethephon residues in or on pineapples. No additional data are required.
- 18b. Pineapple processed commodities. The submitted processing study adequately depicts ethephon residues in processed pineapple fractions; however, no data pertaining to storage stability were included in the current submission. The final adequacy of these data will be determined upon receipt of adequate supporting storage stability data. The data indicate that residues of ethephon concentrated in pulp (1.2x) and bran (5.3x) but did not concentrate in juice, syrup, and slices. The established tolerance for pineapple fruit is 2 ppm, therefore a feed additive tolerance of 12 ppm should be proposed for pineapple bran. Additional data are required.
- 19a. Sugarcane. No new data were included in the current submission. The available residue data (see 1988 Residue Chemistry Chapter) on sugarcane are not adequately supported by the available storage stability data. Currently, only samples stored fresh frozen for 15 months are supported by adequate storage stability data. The registrant must report the interval in which sugar cane samples were stored freeze dried at ambient temperature (in vacuo) prior to analysis. If samples were stored longer than 2 weeks, supporting storage stability data will be required.
- ✓ 19b. Sugarcane processed commodities. No new data were included in the current submission. Residue data requirements remain outstanding. Data on storage

intervals, conditions, and stability for residues of ethephon must accompany all data submitted in response to outstanding requirements.

RECOMMENDATIONS

The 1991 Reregistration Standard Update indicated that blueberries, cranberries, figs, filberts, lemons, and tangerines have been deleted from ethephon product labels, and, therefore requested that tolerances for residues in or on these commodities be revoked. If the registrant intends to support the established tolerances on any of these commodities, residue data previously requested by the 1988 Guidance Document must be submitted.

The registrant must revise the 2 lb/gal SC/L product label to specify a maximum seasonal rate or maximum number of applications for registered uses on wheat.

The registrant requested and was granted a waiver for data requirements pertaining to residues in or on pineapple forage, on the condition that product labels be amended to include a grazing restriction (Agency list of Time Extensions & Data Waivers: Group 4, dated 10/26/89). Product labels must be amended to reflect a grazing restriction if data requirements are to be waived.

DETAILED CONSIDERATIONS

Residue Analytical Methods

Rhône-Poulenc submitted method descriptions (1992; MRID 42268901 through 03, 42298201, and 42300801 through 07) along with residue data submissions for analyses of ethephon and/or MCAA in tomatoes, pineapples (including processed commodities), wheat (grain, straw and processed commodities), apples, peppers, cherries, grapes, blackberries, cottonseed, raisin waste, and cantaloupes. The ethephon methods employ freeze drying, extraction, cleanup and detection techniques similar to those used in the PAM Vol. II methods, and were described in detail in the 1988 Residue Chemistry Chapter. CBRS notes that because sample fortifications were made after freeze drying, and prior to extraction, the freeze drying step is not considered to be part of the residue analytical method. Freeze drying is considered to be part of the sample treatment prior to analysis, and therefore should be covered by adequate storage stability data to ensure no losses of actual residues are incurred. The MCAA methods are described below.

Additional ethephon method validation data, provided for these methods, are summarized below in Table 1.

MCAA residues in or on tomatoes, wheat grain and straw, cottonseed, grapes, cantaloupe, blackberries, and raisin waste were determined using methods similar to the adequate Rhône-Poulenc analytical method designated SOP-90080. This method was described in an Agency review (P. Deschamp, CBRS No. 8635, dated 3/31/92). Residues are extracted into organic solvent (methanol, acidic aqueous solution, or ethyl ether), cleaned up (using liquid-liquid partitioning, or cleanup columns, if required), methylated using diazomethane, and analyzed by GC/ECD.

Table 1. Summary of ethephon method validation recoveries from various crops.

MRID	Commodity	Fortification levels (ppm)	No. of Samples	Percent Recovery
42300803	Pineapple Fruit	0.05	6	77-118
		0.20	6	88-96
		0.50	6	77-94
42300804	Apples	0.05	6	76-94
		0.20	6	69-106
		1.0	6	84-108
42300805	Grapes	0.05	6	64-79
		0.20	6	81-96
		0.50	6	79-101
42300806	Tomatoes	0.05	6	75-89
		0.20	6	72-93
		0.50	6	83-100
42300807	Blackberries	0.05	6	85-112
		0.20	6	78-105
		1.0	6	82-92
42268201	Pineapple Fruit	0.02	6	85-130
		0.20	6	99-119
		3.0	7	64-112
	Beverage Juice	0.02	3	76-94
		0.20	3	94-120
		3.0	3	104-120
	Ion Exchanged Syrup	0.02	6	51-105
		0.20	4	70-115
		3.0	3	76-105
	Slices	0.02	3	78-98
		0.20	3	92-112
		3.0	3	90-106
	Pulp	0.02	3	77-113
		0.20	3	85-120
		3.0	3	97-117
	Bran	0.02	3	55-90
		0.20	3	95-110
		3.0	3	98-108
42268902	Wheat grain*	0.05	1	78
	Wheat straw	0.05	1	108
		0.10	1	79
42268903	Tomatoes	0.02	3	72-88
		0.2	3	76-90
		2.0	3	77-100

*Only concurrent method recoveries were provided for wheat processed commodities; these are summarized in Table 5.

Storage Stability Data

Rhône-Poulenc submitted 14 volumes of storage stability data. Samples of crop matrices were fortified with 0.5-1 ppm of ethephon, and were stored at $\leq -15^{\circ}\text{C}$ for 24 months, or freeze dried and stored at room temperature for 24 months. Untreated crops were fortified with 0.1 ppm of MCAA, and were stored at $\leq 0^{\circ}\text{C}$ for approximately 12 months. Samples were analyzed using methods described in the "Residue Analytical Methods" section above. The results are presented in Table 2 below, along with specific fortification and storage condition information, and corresponding MRID citations.

These data indicate that residues of ethephon are stable in fresh frozen ($\leq -15^{\circ}\text{C}$) peppers, cherries, pineapple, apples, grapes, tomatoes, and blackberries for 24 months. Ethephon residues are also stable in freeze-dried cherries, pineapple, apples, grapes, tomatoes, and blackberries for 24 months stored at room temperature. These data indicate, however, that ethephon residues are only stable in freeze dried peppers for up to 4 months stored at room temperature, with $\leq 30\%$ remaining after 18 months of storage.

The available storage stability data support existing ethephon residue data on tomatoes, apples, cherries, blackberries, grapes, and pineapple fruit. Additional storage stability data are required on tomato processed commodities, cucumbers, apple processed commodities, grape processed commodities, wheat grain and straw, processed wheat commodities, cottonseed (including processed commodities), cantaloupes, and processed pineapple commodities to support actual storage conditions and intervals of the useful residue studies (see 1988 Chapter and subsequent reviews).

The registrant must provide the actual storage intervals and conditions for peppers, cantaloupes, sugarcane, cucumbers, apple processed commodities, grapes, and grape processed commodities. The registrant must clearly indicate the actual intervals and temperatures in which samples were stored fresh frozen and the actual intervals and temperatures in which samples were stored freeze dried, before final judgement of the adequacy of the residue data can be determined.

Data on storage intervals, conditions, and stability of ethephon must accompany all data submitted in response to outstanding residue data requirements for grapes, raisin waste, walnuts, apples, apple processed commodities, coffee, coffee processed commodities, cottonseed, and sugarcane processed commodities.

Table 2. Percent recovery of ethephon from duplicate samples fortified with ethephon and stored for up to 24 months.

Commodity (MRID)	Fortification (ppm)	Sample Stored	Concurrent Method Recoveries	Ethephon Recoveries ^a from Stored Samples; Months Stored										
				0	1	2	4	6	9	12	18	24		
Fresh Peppers (42300801)	1	fresh/frozen	85-130	92	--	109	98	91	92	104	100	92		
				85	--	100	98	79	78	113	109	100		
		freeze dried/RT ^b	82-130	92 ^c	--	85	112	52 ^d	49	48	28	--		
				85	--	77	113	70	59	53	28	--		
Cherries (42300802)	1	fresh/frozen	77-116	108	97	94	--	88	121	87	93	104		
				113	95	81	--	90	91	86	77	92		
		freeze dried/RT	80-108	108	103	131	--	90	100	109	84	82		
				113	90	119	--	105	86	109	73	84		
Pineapple Fruit (42300803)	0.5	fresh/frozen	79-110	104	112	102	102	110	88	88	106	90		
				104	118	102	124	108	88	90	102	114		
		freeze dried/RT	73-104	104	122	112	100	112	116	94	104	86		
				104	118	104	110	124	102	90	84	96		
Apples (42300804)	1	fresh/frozen	86-102	102	102	104	99	103	89	100	100	88		
				95	97	101	90	108	96	98	94	102		
		freeze dried/RT	79-102	102	103	102	88	86	85	79	91	94		
				95	92	106	114	96	88	77	88	95		
Grapes (42300805)	0.5	fresh/frozen	83-112	88	84	100	118	106	76	112	88	106		
				102	84	96	112	82	90	98	90	86		
		freeze dried/RT	77-110	88	92	108	110	90	82	86	80	96		
				102	84	116	106	98	90	108	78	112		
Tomatoes (42300806)	0.5	fresh/frozen	71-104	106	82	116	104	98	86	100	86	102		
				92	84	82	124	96	116	86	96	110		
		freeze dried/RT	71-103	106	102	124	80	86	76	100	84	104		
				92	88	120	84	98	98	100	72	86		
Blackberries (42300807)	1	fresh/frozen	88-95	116	110	104	107	104	87	125	82	87		
				93	111	106	116	96	85	101	121	101		
		freeze dried/RT	82-104	116	88	97	104	110	100	112	104	86		
				93	93	104	68	98	89	114	67	83		

^aCorrected for % recovery from method spike for each storage interval for each commodity. ^bRT = room temperature. ^cZero-time samples analyzed prior to freeze-drying.

^dTwo additional samples were analyzed because of low recoveries from first analyses; however, no explanation was given for initial low recovery results.

Table 3. Percent recovery of MCAA from duplicate samples fortified with ethephon and stored fresh frozen at $< 0^{\circ}\text{C}$ for up to 24 months.

Commodity (MRID)	Fortification (ppm)	Concurrent Method Recoveries ^a	MCAA Recoveries ^b from Frozen Samples; Days Stored						
			0	23-30	54-62	75-88	166-189	265-276	341-360
Cottonseed (42268904)	0.1	67-95	125 126	108 104	98 88	84 76	81 101	92 89	74 75
Grapes (42268905)	0.1	68-112	93 95	96 97	89 90	94 96	91 93	89 90	102 104
Raisin waste (42268905)	0.1	70-93	94 91	37 39	37 40	85 80	55 50	44 45	37 40
Wheat grain (42268906)	0.1	63-79	95 79	79 71	88 98	92 92	105 105	84 85	79 87
Wheat straw (42268906)	0.1	62-115	96 97	69 69	93 89	93 106	76 80	76 77	97 90
Tomatoes (42268907)	0.1	71-116	98 98	93 93	97 91	93 79	88 81	101 86	70 77
Cantaloupes (42268908)	0.1	77-110	89 93	91 96	91 89	86 86	86 88	88 88	90 85
Blackberries (42268909)	0.1	68-101	92 98	108 108	91 79	88 86	108 109	83 83	87 87
Pineapple (42300808)	0.1	77-97	90 95	89 87	94 91	82 79	99 93	80 75	82 86

^aSeven samples fortified and analyzed concurrently with stored samples; method recoveries corrected for apparent MCAA residues found in or on untreated controls. ^bCorrected for percent recovery from method spike for each storage interval for each commodity.

Magnitude of the Residue in Plants

Rhône-Poulenc has five products that are registered for use on food or feed crops: two 2 lb/gal SC formulations (EPA Reg. No. 264-267, and -376), one 4 lb/gal SC formulation (EPA Reg. No. 264-257), one 4 lb/gal EC formulation (EPA Reg. No. 264-377), and one 0.33 lb/gal SC formulation (EPA Reg. No. 264-263). Data are currently submitted on the 4 lb/gal SC/L, and the 2 lb/gal SC/L formulations.

The use patterns for wheat, tomatoes, and pineapple addressed in this review are based on the uses supported by Rhône-Poulenc. However, registrations for other companies currently exist. When end-use product DCIs are developed (e.g., at issuance of the RED), RD should require that all end-use product labels (e.g., any unamended basic producer labels, SLNs, and products covered under the generic data exemption) be amended such that they are consistent with the amended basic producer labels unless an EP registrant chooses to support uses other than those supported by basic producers.

Results from field trials and processing studies are summarized in Tables 4 and 5, respectively. Details for each crop are presented below.

Wheat grain and straw. Tolerances of 2 and 10 ppm have been established for ethephon residues in or on wheat grain and wheat straw, respectively (40 CFR §180.300[a]).

The 4 lb/gal EC formulation is registered for a single foliar application to wheat at 0.25-0.5 lb ai/A during the early boot to the late boot stages, but before head or awn emergence. Applications may be made using controlled droplet sprayer equipment with at least 5 gallons of water, conventional ground sprayer using at least 7 gal/A of water, or with aerial equipment using at least 3 gal/A of water. The specified maximum seasonal application rate is 0.5 lb ai/A for the 4 lb/gal EC. The 2 lb/gal SC/L formulation is registered for application to wheat at 0.25-0.5 lb ai/A in 3-25 gal/A of water using air or ground equipment during the early boot to the late boot stages, but before head or awn emergence. A maximum seasonal application rate is not specified for the 2 lb/gal SC/L. A 40-day PHI has been established. Livestock may not be grazed on treated pasture or forage or be fed treated hay or silage (Information obtained from product labels for EPA Reg. Nos. 264-376 and -377).

Rhône-Poulenc Ag Company submitted data (1992; MRID 42268902) from 10 tests conducted in CO(2), KS(2), MN(2), ND(2), and WA(2) depicting ethephon and MCAA residues in or on wheat grain and straw following a single foliar application of the 4 lb/gal EC formulation. Ethephon was applied at 0.5 lb ai/A (1x) using ground and aerial equipment at 7-8.25 gal/A and 3 gal/A, respectively. Tests were conducted on non-irrigated spring wheat in MN and ND, non-irrigated winter wheat in KS, and irrigated winter wheat in CO and WA. Grain and straw samples were collected from tests in CO, KS, MN, and ND at 35, 40, and 60 days posttreatment, and from the WA tests at 40, 60, and 70 days posttreatment.

Ethephon residues were determined in grain and straw using a method similar to the GLC/FPD Method I in PAM, Vol. II. The detection limit for grain and straw is 0.05 ppm. Apparent residues of ethephon were <0.05 ppm (nondetectable) in or on 30 control samples of grain and straw.

MCAA residues in grain and straw were determined using two GLC/ECD methods described in the residue analytical method section above. The detection limits for grain and straw are 0.01 and 0.02 ppm, respectively. Apparent MCAA residues were <0.001-0.005 ppm in or on 15 control samples of grain and 0.014-0.117 ppm in or on 15 control samples of straw.

Ethephon and MCAA residues, storage intervals and conditions, and concurrent method recoveries are summarized in Table 4. Ethephon residues were <0.05-0.94 ppm in or on 45 grain samples treated aerially and <0.05-0.61 ppm in or on 45 grain samples from ground tests. Ethephon residues were 0.09-4.5 ppm in or on 45 straw samples treated aerially and 0.23-3.1 ppm in or on 45 straw samples from ground tests. MCAA residues were <0.001-0.008 ppm in or on 90 grain samples treated with ethephon (ground and aerial applications). MCAA residues were 0.004-0.145 ppm in or on 90 straw samples treated with ethephon (ground and aerial applications).

Geographic representation is adequate. The test states of CO(3%), KS(17%), MN(5%), ND(14%), and WA(6%) accounted for 45% of the 1990 U.S. wheat production (Agricultural Statistics, 1991, p. 5) and represent the major wheat growing regions of the United States. These data indicate that ethephon residues are not likely to exceed the established 2 ppm and 10 ppm tolerances in or on grain and straw harvested 40 days after a ground or aerial application at 0.5 lb ai/A.

The labels for the 2 lb/gal SC/L should be revised to specify a maximum seasonal application rate; the available data indicate that 0.5 lb ai/A is appropriate.

Tomatoes. A tolerance of 2 ppm has been established for residues of ethephon in or on tomatoes (40 CFR §180.300[a]).

The 2 lb/gal SC/L formulation is registered for foliar application to tomatoes at 0.31-1.63 lb ai/A. Ground application is made in 20-100 gal/A (maximum 40 gal/A for fresh market) and aerial application is to be made in 10-12 gal/A. [Note: CBRS No. 6851 dated 8/22/90 by H. Fonouni recommended establishment of a 3-day PHI for tomatoes.]

Rhône-Poulenc Ag Company (1992; MRID 42268903) submitted data from two tests conducted in FL depicting the residues of ethephon and MCAA in or on ripe tomatoes harvested 3, 7, or 14 days following a single broadcast application of the 2 lb ai/gal SC formulation at 1.6 lb ai/A (1x) in 20 gal/A using ground equipment or in 10 gal/A using aerial equipment. Residues of ethephon were <0.02 ppm in or on six treated samples harvested 3, 7, or 14 days posttreatment from the ground equipment test plot (two samples per interval), 0.16-0.32 ppm in or on three treated samples harvested 3 days posttreatment

from the aerial test plot, and <0.02-0.11 ppm in or on six treated samples harvested 7 or 14 days posttreatment from the aerial test plot. Residues of MCAA were 0.002-0.011 ppm in or on 15 treated samples harvested 3, 7, or 14 days posttreatment from both plots.

Tomato samples were analyzed for ethephon using a method similar to the GLC/FPD Method I in PAM, Vol. II. The method limit of detection is 0.02 ppm. Apparent residues (uncorrected) of ethephon were <0.02 ppm (nondetectable) in or on six control samples.

Tomato samples were analyzed for MCAA using the GLC/ECD method described in the residue analytical method section above. The detection limit is 0.01 ppm. Apparent residues of MCAA were 0.002-0.008 ppm in or on six control samples. MCAA results were not corrected for method recoveries or for apparent residues detected in control samples.

Ethephon and MCAA residues, storage intervals and conditions, and concurrent method recoveries are summarized in Table 4.

Geographic representation is adequate. The test state of FL (45%; 6%), together with the previously tested state of CA (29%; 81%) accounted for approximately 74% of the U.S. fresh market tomato production and 87% of the total U.S. tomato production in 1990 (Agricultural Statistics 1991, p. 165-6). These data indicate that residues of ethephon per se are not likely to exceed the established 2 ppm tolerance in or on tomatoes harvested 3 days following a single broadcast application at 1.6 lb ai/A. No additional data are required.

Pineapple. A tolerance of 2 ppm has been established for residues of ethephon in or on pineapples (40 CFR §180.300[a]).

The 4 lb ai/gal SC/L formulation is registered for two broadcast applications to pineapple plants using ground equipment. The first application for floral induction is applied to mature plants at 2-4 lb ai/A at 6-8 months prior to anticipated harvest. The second application for fruit shell coloration is made at 0.5-1 lb ai/A to plants bearing immature fruit at least 2 days prior to harvest. The current PHI for pineapple is 2 days, and a 7-day pregrazing interval is in effect (information obtained from product label for EPA Reg. No. 264-257).

Rhône-Poulenc submitted data (1992; MRID 42268201) from 12 tests conducted in HI depicting the residues of ethephon and MCAA in or on pineapple fruit following the last of two broadcast applications of the 4 lb/gal SC/L formulation at 2+1 lb ai/A (1x) and at 2+2 lb ai/A (1.3x) at 100 gal/A using ground equipment. Pineapple fruit were sampled at 1, 2, 4, and 8 days after the second application and three fruit samples were harvested from each test at each sampling interval.

Ethephon residues were determined using a method similar to the GLC/FPD Method I in PAM, Vol. II. The limit of detection for the method is 0.02 ppm. Apparent residues of ethephon were <0.02 ppm (nondetectable) in or on 23 control samples.

Residues of MCAA were determined using a GLC/ECD method described in the residue analytical method section above. The validated detection limit is 0.01 ppm. Apparent residues of MCAA in or on 23 control samples were reported as <0.001-0.003 ppm.

Ethephon and MCAA residues, storage intervals and conditions, and concurrent method recoveries are summarized in Table 4. Ethephon residues were <0.02-0.82 ppm in or on a total of 69 pineapple samples treated at 1x and 0.05-1.9 ppm in or on 70 samples treated at 1.3x. MCAA residues ranged from <0.001-0.003 ppm in or on 139 pineapple samples.

Geographic representation is adequate. The test state of HI accounted for 100% of the 1987 U.S. pineapple production (1987 Census of Agriculture, p. 407). These data indicate that ethephon residues are not likely to exceed the established 2 ppm tolerance in or on pineapple fruit harvested 2 days following the second of two broadcast applications at 1x. No additional data are required.

Processed food/feed

Wheat. In response to the Guidance Document, Rhône-Poulenc Ag Company submitted data (1992; MRID 42268901) depicting the concentration/reduction of residues of ethephon in commodities processed from wheat grain bearing measurable residues.

Wheat grain samples for the processing study were obtained from a residue trial conducted in TX on irrigated winter wheat. The 4 lb/gal EC formulation was applied as a foliar application at 1 lb ai/A (2x) at 8.25 gal/A using ground equipment. Grain samples were harvested 65 days posttreatment and stored at -18 °C for 20 days prior to processing. Grain dust samples were obtained by sieving whole grain and pooling prescribed amounts of dust passing through and remaining on top of 2030, 1190, 841, and 420 µm screens. Whole grain was then processed using a simulated commercial process (American Association of Cereal Chemists method 26-21). Grain was sequentially processed into bran, middlings, shorts and germ, red dog, low grade flour, and patent flour fractions. After processing, sample fractions were stored at -20 °C for 138 days prior to analysis of ethephon residues.

Ethephon residues in wheat grain fractions were determined using a method similar to the GLC/FPD Method I in PAM, Vol. II. The detection limit is 0.05 ppm for whole grain and all processed fraction except red dog, for which the detection limit is 0.1 ppm.

For sample analysis, a single control and treated sample of whole grain and each processed fraction were analyzed. Apparent residues of ethephon were <0.05 ppm (nondetectable) in or on control samples of each fraction, except for red dog for which apparent residues were <0.1 ppm. Ethephon residues, storage intervals and conditions, and concurrent method recoveries are summarized in Table 5.

The data adequately depict ethephon residues in processed wheat commodities. The data indicate that residues of ethephon concentrated in bran (1.4x), shorts and germ (1.5x), and

red dog (1.2x) but did not concentrate in grain dust, middlings, and flour. These data support the established food/feed additive tolerances of 5 ppm for wheat milled fractions.

Pineapple. Rhône-Poulenc Ag Company submitted data (1992; MRID 42268201) depicting the concentration/reduction of ethephon residues in pineapple commodities processed from fruit bearing measurable residues.

Samples for the processing study were obtained from one of the above residue trials (Trial Nos. 89-135), in which plants were treated with ethephon at 2+2 lb ai/A (1.3x). Fruit were harvested 2 days after the second ethephon application. Immediately after harvest, fruit samples were commercially processed into juice, ion exchanged syrup, slices, pulp, and bran fractions. After processing, sample fractions were stored fresh frozen at -10 °C for up to 11 months prior to analysis of ethephon residues.

Ethephon residues were determined using a method similar to the GLC/FPD Method I in PAM, Vol. II. The limit of detection for the method is 0.02 ppm. Apparent ethephon residues in a control sample from each commodity were <0.02 ppm (nondetectable). Ethephon residues, storage intervals and conditions, and concurrent method recoveries are summarized in Table 5.

The submitted data adequately depict ethephon residues in processed pineapple fractions. The data indicate that residues of ethephon concentrated in pulp (1.2x) and bran (5.3x) but did not concentrate in juice, syrup, or slices. The established tolerance for pineapple fruit is 2 ppm; therefore, a feed additive tolerance of 12 ppm should be proposed for pineapple bran.

Table 4. Ethephon and MCAA residues found in or on treated crop samples.

Commodity (MRID)	Application (No. of Tests)	Treatment Rate (lb ai/A)	PTI (days)	No. of Samples	Concurrent Recoveries (%)	Residues Found (ppm)		Storage Interval ^g (days)	
						Ethephon	MCAA ^b	Fresh Frozen	Freeze Dried
Tomatoes ^c (42268903)	Ground (1)	1.6	3	2	64, 76 ^d	<0.02, <0.02	0.003, 0.011	449-470	8-23
			7	2	97	<0.02, <0.02	0.002, 0.003		
			14	2	85	<0.02, <0.02	0.002, 0.002		
	Aerial (1)	1.6	3	3	116	0.16-0.32	0.004-0.008		
			7	3	109	<0.02-0.11	0.003-0.005		
Pineapple fruit ^e (42268201)	Ground (6)	2 + 1	14	3	101	0.05-0.07	0.002, 0.002, 0.002		
			1	15	70-120 ^d	0.05-0.81	<0.001-0.003	227-267 ^e	
			2	18	86-120	0.02-0.82	<0.001-0.002		
			4	18	87-119	0.02-0.51	<0.001-0.002		
			8	18	83-121	<0.02-0.52	<0.001-0.002		
	Ground (6)	2 + 2	1	16	70-120	0.18-1.9	<0.001-0.003		
			2	18	70-120	0.03-1.3	<0.001-0.003		
			4	18	87-120	0.08-1.1	<0.001-0.003		
			8	18	83-121	0.05-0.94	<0.001-0.003		
			35	12	59-114 ^s	0.12-0.61	0.001-0.004	192-393	n/a ^b
Wheat grain ^f (42268902)	Ground (10)	0.5	40	15		0.11-0.48	0.002-0.006		
			60	15		<0.05-0.25	<0.001-0.008		
			70	3		0.13-0.19	0.001-0.005		

Table 4. (continued)

Commodity (MRID)	Application (No. of Tests)	Treatment Rate (lb ai/A)	PTI (days)	No. of Samples	Concurrent Recoveries (%)	Residues Found (ppm)		Storage Interval ^a (days)	
						Ethephon	MCAA ^b	Fresh Frozen	Freeze Dried
Wheat grain (continued)	Aerial (10)	0.5	35	12		0.07-0.94	0.001-0.004		
			40	15		0.07-0.67	<0.001-0.005		
			60	15		<0.05-0.29	0.001-0.007		
			70	3		0.07-0.08	0.006		
Wheat straw ^c (42268902)	Ground (10)	0.5	35	12	68-127 ^e	0.84-3.1	0.01-0.043	192-393	n/a ^b
			40	15		0.41-1.8	0.018-0.06		
			60	15		0.23-1.9	0.004-0.145		
			70	3		1.1-1.6	0.01-0.014		
	Aerial (10)	0.5	35	12		0.96-4.3	0.014-0.067		
			40	15		0.55-2.4	0.019-0.078		
			60	15		0.09-4.5	0.006-0.132		
			70	3		1.2-1.7	0.022-0.031		

^aStorage interval from harvest to freeze drying, then from freeze drying to ethephon analysis. ^bMCAA residues were not corrected for concurrent method recovery. ^cEthephon residues were corrected for concurrent method. ^dRecovery from untreated samples fortified at 0.2 ppm with ethephon and analyzed concurrently with treated sample sets. ^eTotal storage interval; the dates that pineapple samples were freeze dried prior to residue extraction were not reported. ^fNeither ethephon nor MCAA residues were corrected for concurrent method recoveries. ^gRecovery from wheat grain samples fortified at 0.05-5 ppm or wheat straw samples fortified at 0.02-5 ppm with ethephon. These recoveries were corrected for apparent residues in controls. ^hNot applicable: freeze-drying is not part of sample preparation for wheat grain or straw prior to residue extraction.

Table 5. Ethephon residues in or on fractions processed from one sample each of pineapple fruit or wheat grain bearing measurable, weathered residues.

Commodity (MRID)	Fraction	Treatment Rate (lb ai/A)	Concurrent Recovery (%)	Residues Found (ppm) ^a		Concentration Factor ^c		Storage Interval ^d (days)	
				Ethephon ^b	Average			Fresh Frozen	Freeze Dried
Pineapple (42268201)	Whole fruit	2 + 2	113	0.17-0.20	0.18	--	--	286-307 ^e	
	Beverage juice		100	0.06-0.08	0.07	0	0	300-314	
	Ion exchanged syrup		88	0.10-0.18	0.15	0	0	278-301	
	Slices		108	0.04-0.05	0.05	0	0	278-288	
	Pulp		114	0.21-0.25	0.22	1.2	1.2	268-280	
	Bran		84	0.92-0.98	0.95	5.3	5.3	301-322	
	Whole grain	0.5	73, 88	0.17	--	--	--	127	n/a ^f
Wheat (42268901)	Grain dust		89, 105	0.10	--	0	0	107	n/a
	Bran		71, 75	0.23	--	1.4	1.4	107	n/a
	Middlings		75, 71	<0.05	--	0	0	115	n/a
	Shorts & Germ		54, 66	0.25	--	1.5	1.5	140	n/a
	Red dog		74	0.20	--	1.2	1.2	115	n/a
	Low grade flour		98, 109	<0.05	--	0	0	140	n/a
	Patent flour		59, 74	<0.05	--	0	0	140	n/a

^aEthephon residue values corrected for concurrent method recovery. ^bA single sample of each pineapple fraction was analyzed in triplicate; a single sample of each wheat fraction was analyzed once. ^cConcentration factors for pineapple were calculated using the average of triplicate results. ^dStorage interval from time of harvest or processing until analysis for ethephon. Pineapple fruit was processed the day of harvest; wheat grain was processed after 20 days of frozen storage. ^eTotal storage interval; the dates that pineapple samples were freeze dried prior to residue extraction were not reported. ^fNot applicable: The analytical method for wheat fractions does not include freeze drying.

References.

Citations for the MRID documents referenced in this review are presented below. Submissions reviewed in this document are indicated by shaded type.

- 42268901 Conn, R. (1992) Magnitude of the Residue of Ethephon in the Processed Fractions of Wheat: Lab Project Number: SARS-89-2A-24P: SARS-90-TX-24P: MKL-001-90-02. Unpublished study prepared by Stewart Agricultural Research Services, Inc., The Texas A&M Univ. System, and McKenzie Laboratories, Inc. 164 p.
- 42268902 Conn, R. (1992) Magnitude of the Residue of Ethephon and Monochloroacetic Acid (MCAA) in or on Wheat: SARS-89-24: MKL-001-90-02: SPRA-90-100. Unpublished study prepared by Stewart Agricultural Research Services, Inc., Rhone-Poulenc Ag Co., and McKenzie Laboratories, Inc. 330 p.
- 42268903 Nygren, R. (1992) Ethrel: Tomato Magnitude of Residue Study: Lab Project Number: USA90E16: 41067. Unpublished study prepared by Rhone-Poulenc Ag Co., McKenzie Laboratories, Inc., and Glades Crop Care, Inc. 137 p.
- 42268904 Upalawanna, S. (1992) Storage Stability of Monochloroacetic Acid (MCAA) on Cottonseed: Lab Project Number: EC-90-133. Unpublished study prepared by Rhone-Poulenc Ag Co. 45 p.
- 42268905 Upalawanna, S. (1992) Storage Stability of Monochloroacetic Acid (MCAA) on Grapes and Raisin Waste: Lab Project Number: EC-90-136. Unpublished study prepared by Rhone-Poulenc Ag Co. 56 p.
- 42268906 Upalawanna, S. (1992) Storage Stability of Monochloroacetic Acid (MCAA) on Wheat Grain and Wheat Straw: Lab Project Number: EC-90-135. Unpublished study prepared by Rhone-Poulenc Ag Co. 49 p.
- 42268907 Upalawanna, S. (1992) Storage Stability of Monochloroacetic Acid (MCAA) on Tomatoes: Lab Project Number: EC-90-134. Unpublished study prepared by Rhone-Poulenc Ag Co. 41 p.
- 42268908 Upalawanna, S. (1992) Storage Stability of Monochloroacetic Acid (MCAA) on Cantaloupes: Lab Project Number: EC-90-138. Unpublished study prepared by Rhone-Poulenc Ag Co. 41 p.
- 42268909 Upalawanna, S. (1992) Storage Stability of Monochloroacetic Acid (MCAA) on Blackberries: Lab Project Number: EC-90-137. Unpublished study prepared by Rhone-Poulenc Ag Co. 42 p.

- 42298201 Nygren, R. (1992) Ethrel/Pineapple/Residue [Magnitude of the Residue Crop Trials and Processing Fractions: Lab Project Number: USA89E27. Unpublished study prepared by Rhone-Poulenc Ag Co., Maui Pineapple Co. Ltd., and Hawaiian Sugar Planters Assoc. 291 p.
- 42300801 Nygren, R. (1992) Storage Stability Study of Ethephon in/on Whole Fresh Peppers: Lab Project Number: 89-REN-P-S. Unpublished study prepared by Rhone-Poulenc Ag Co. 45p.
- 42300802 Nygren, R. (1992) Storage Stability Study of Ethephon in/on Whole Fresh Cherries: Lab Project Number: 89-REN-CH-S. Unpublished study prepared by Rhone-Poulenc Ag Co. 42 p.
- 42300803 Eckert, J. (1992) Determination of the Storage Stability of Ethephon in Pineapple Fruit: Lab Project Number: RP-01-89E. Unpublished study prepared by Enviro-Bio-Tech, Ltd. 57 p.
- 42300804 Eckert, J. (1992) Determination of the Storage Stability of Ethephon in Apple Fruit: Lab Project Number: RP-01-89C. Unpublished study prepared by Enviro-Bio-Tech, Ltd. 57 p.
- 42300805 Eckert, J. (1992) Determination of the Storage Stability of Ethephon in Grape Berries: Lab Project Number: RP-01-89D. Unpublished study prepared by Enviro-Bio-Tech, Ltd. 57 p.
- 42300806 Eckert, J. (1992) Determination of the Storage Stability of Ethephon in Tomato Fruit: Lab Project Number: RP-01-89A. Unpublished study prepared by Enviro-Bio-Tech, Ltd. 57 p.
- 42300807 Eckert, J. (1992) Determination of the Storage Stability of Ethephon in Blackberry Fruit: Lab Project Number: RP-01-89B. Unpublished study prepared by Enviro-Bio-Tech, Ltd. 57 p.
- 42300808 Upalawanna, S. (1992) Storage Stability of Monochloroacetic Acid (MCAA) on Pineapples: Lab Project Number: EC-90-139. Unpublished study prepared by Rhone-Poulenc Ag Co. 41 p.

Agency Memoranda:

CB No.: 6851
Subject: Ethephon on Tomatoes, Revised Label. ID No(s). 264-267.
To: R. Taylor
From: H. Fonouni
Dated: 8/22/90
MRID(s): none.

CBRS No.: 7936
Subject: EPA Reg. No. 264-267. Amended use request for Ethrel®.
To: R. Taylor
From: B. Cropp-Kohlligian
Dated: 9/26/91
MRID(s): 41872501.

CBRS No.: 8127
Subject: Reregistration of Ethephon. Rhone-Poulenc Letter of 5/20/91.
To: C. Peterson
From: P.A. Deschamp
Dated: 7/18/91
MRID(s): none.

CBRS No.: 8564
Subject: Reregistration of Ethephon. Apple processing study.
To: L. Rossi/C. Peterson
From: P.A. Deschamp
Dated: 4/1/92
MRID(s): 41872502.

CBRS No.: 8627
Subject: Reregistration of Ethephon. Storage Stability Data for Walnuts.
To: L. Rossi/C. Peterson
From: P.A. Deschamp
Dated: 4/3/92
MRID(s): 42010401.

CBRS No.: 8635
Subject: Reregistration of Ethephon. Tomato field trials and processing studies.
To: C. Peterson
From: P.A. Deschamp
Dated: 3/31/92
MRID(s): 42016701.

CBRS No.: 10246
Subject: Reregistration of Ethephon. Review of chromatograms of whole apples and apple processed commodities.
To: L. Propst
From: D. McNielly
Dated: 9/8/92
MRID(s): 42379101.